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TRANSACTIONS

On the Mannitol-forming Bacteria Isolated from Sweet Potatoes (*Ipomoea edulis*, Makino).

By Yasuo IWASAKI.

(Chiba Horticultural College, Matsudo-machi, Chiba-ken.)

(Received October 10, 1935.)

Isolation and characteristics of the bacteria :–

Washed sweet potatoes are grated and some water is added to the mass. The mixture is fermented. From the fermented juice, mannitol-forming bacteria are isolated by the plate culture method using the agar sweet potato water extract containing $CaCO_3$.

The cells of the bacteria are short rods and their ends are convex. Some of bacteria are one celled, but most of them form chains two or three cells attached to each other. The length of a cell is $0.7 \sim 1.0\,\mu$ and mostly, $1.0\,\mu$. They are non-motile, and Gram's stain is positive. The spore can not be found after $4 \sim 10$ days' culture.

The bacteria scarsely produce any gas in Koji water, bouillon and sweet potato water extract, but the solutions are turbid and sedimented. They grow in beaded form for 24 hours at $30 \sim 31°$ on a Koji water or a sweet potato extract agar slant, but not on a bouillon agar slant, and do not liquify gelatin media.

Isolation and identification of mannitol :–

Well water is added to sweet potato pulp in the proportion of 2 to 1 and the mixture is stirred and pressed through cotton cloth. The pressed juice is stood and the starch is precipitated. The upper solution is sterilized and inoculated with the isolated mannitol-forming bacteria and fermented at $30 \sim 31°$ for 3 days. A large quantities of milk of lime are poured upon the fermented juice, and the mixture is stirred and sucked down. The excess of the lime in the filtrate is removed by CO_2-gas, and the filtrate is evaporated under vacuum to a syrupy state. After a small portion of methyl alcohol is added to the syrup, the mixture is stood or evaporated a little. Then, crystalline compound forms.

The refined substance has a sweet taste, and is soluble in water, but very slightly soluble in cold alcohol and insoluble in ether. The aqueous solution does not reduce the Fehling's solution, but by oxidizing with nitric acid, the solution reduces the Fehling's solution. The melting point is 165 ~166° (uncorr.) and that mixed with recrystallized Merck's mannital is 165 ~166°. Found: C, 39.70, 39.80; H, 7.83, 7.85%. $C_6H_{14}O_6$ requires C, 39.56; H, 7.69%. Hexa-acetyl-mannitol is prepared with acetic acid anhydride and zinc chloride. The melting point is 122° (uncorr.). Found: C, 50.03, 49.86; H, 6.15, 6.03%. $C_{18}H_{26}O_{12}$ requires C, 49.77; H, 5.99%.

Properties of the acids in the fermented juice:–

In the fermented juice, organic acids are produced as fermenting products. In order to isolate an unvolatile acid, the fermented juice is concentrated and acidified with H_2SO_4. The solution is extracted with ether. The ether solution is evaporated. The residue has the following reactions. Denigé's, Uffelmann's and thiophene reactions are positive. Zinc lactate is prepared with zinc carbonate and ashed. The zinc quantity of the ashes is 26-78%. $(C_3H_5O_3)_2Zn$ requires 26.85%.

Relation of producing of the mannitol, acids, and fermenting hours:–

1. A relation of between producing of the mannitol and the hours of the fermentation is as follow:

2.4 gr of a mixture of glucose and fructose, which are mixed in equal quantity, are added to 200 ml of the sweet potato water extract. The sterilized culture soltions are inoculated by the bacteria and fermented at 30~31°. The mannitol producing in every 24 hours is determined by Smit's method*. The sugar in the solution is determined by Bertland's method and the pH by the quinhydrone method. The culture solution contains 2.79% as invert sugar, and the pH is 5.4.

TABLE I.

Fermenting days	Titration numbers of 0.1 N Na-thiosulphate (ml)	Titration numbers increased by fermentation (ml)	Mannitol produced in 200 ml culture solution (gr)
original solution	2.84	——	——
1	9.80	6.96	0.242
2	22.65	19.81	0.654
3	21.01	18.18	0.603
4	22.12	19.28	0.637
5	22.44	19.60	0.647
6	22.25	19.41	0.641
7	22.75	19.91	0.650

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* Smit: Z. anal. Chem., 53, 473~490 (1914).

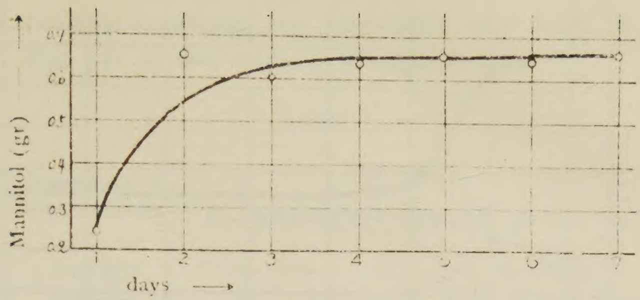

Fig. 1.

According to these results, the production of mannitol is very rapid and mannitol is mostly produced by 24 hours.

2. A relation of changes of acids, sugars in the fermented juice, and the fermenting hours is as follow :–

The culture solution is the sweet potato water extract and sugar is not added.

TABLE II.

Fermenting days	Titration numbers of 0.1N KOH to neutralize 10 ml of juice (ml)	Titration numbers of 0.1N KOH to neutralize a volatile acid in 10ml juice (ml)	Total sugar (as glucose) (%)	Reducing sugar (as glucose) (%)
Original solution	0.4	——	0.69	0.37
1	0.9	0.8	0.57	0.38
2	1.5	0.9	0.45	0.33
3	1.7	1.0	0.41	0.30
4	2.0	1.2	0.37	0.25
5	1.9	——	0.39	0.26
6	2.0	1.1	0.37	0.25
7	2.3	1.2	0.31	0.23

3. The changes of acids and pH in the fermented juice are as follow :–

TABLE III.

Fermenting days	Titration numbers to neutralize 10 ml of juice (ml)	Titration numbers to neutralize a volatile acid in 10 cc of juice (ml)	pH
original solution	0.5	0.1	5.5
1	0.7	0.2	5.2
2	2.7	1.6	3.8
3	3.1	1.3	3.7
4	3.2	1.5	3.7
5	3.1	——	3.7
6	3.2	1.6	3.7
7	3.2	1.5	3.7

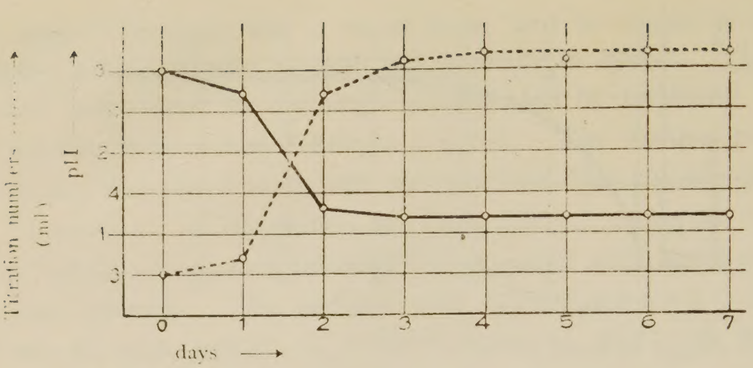

Fig. 2.

Sugars which are utilized by the bacteria :-

The culture solution is prepared by adding hexoses to bouillon. The hexoses are Merck's preparations. 3 gr of the sugars are added to 200 ml bouillon. The sterilized culture solutions are inoculated and fermented at 30 ~31 °C. The sugars are determined by Bertland's method and the quantity of the sugar in original solution is showed as copper 100.

TABLE IV.

Lot of culture solution	Before fermentation		After fermentation				Titration numbers of 0.1 N Na-Thiosulphate (ml)	Titration numbers increased by fermentation (ml)	Mannitol produced in original solution (gr)
					3rd day				
	pH	sugar	1st day	2nd day		pH	sugar			
glucose	5.9	100	turbid	sediment	some state as 2nd day	4.3	79.1	1.5	0.2	——
mannose	5.8	100	slightly turbid	turbider than galactose lot	sediment	4.4	83.5	1.4	0.1	
galactose	5.8	100	slightly turbid	same state as 1st day	same state as 2nd day	5.6	99.8	1.4	0.1	——
fructose	5.8	100	turbid	sediment	same state as 2nd day	3.9	11.1	24.1	22.8	0.938
nonsugar	6.0	——	——	——	——	6.1	——	1.3	——	——

Through the above cited results, the mannitol-forming bacteria which are isolated by the author, utilize fructose alone to produce mannitol and do not glucose, nor mannose, nor galactose. The changes of pH and sugars in the culure solutions during the fermentation exhibit the possibility of utilization of a very small amount of the other hexoses except fructose to sustain their lives.

Optimum temperature for growth of the bacteria :-

The culture solutions are prepared by adding 1% fructose to bouillon.

The sterilized fructose-bouillons are inoculated and kept at the following temperatures. The pH of the original solution is 6.6.

TABLE V.

Fermenting day	Appearance of fermented juice	Temperatures of fermentation (c)						
		19~20	24~25	30~31	34~35	40~41	45~46	49~51
1st day	Turbidity	+	++	++	++	no change	++	no change
	Sediment	±	++	++	+++	〃	flocculant	〃
2nd day	Turbidity	+	++	++	+++	no change	+++	no change
	Sediment	±	++	++	++++	〃	flocculant	〃
	Titration numbers of 0.1N KOH for 10 ml culture solution (ml)	2.3	2.9	3.6	3.7	——	3.3	——
	pH	5.1	4.6	4.5	4.4	——	4.8	——
	Sugar (%) (as glucose)	0.45	0.39	0.26	0.13	——	0.54	——

From the results, the bacteria have an optimum temperature of 34~35°, but as many other bacteria, the optimum temperature is perhaps the blood temperature.

Relation between growth and pH :–

A few ml of 0.1 N HCl or NaOH solution are added to the fructose-bouillon, and the pH of the bouillon is controlled. The sterilized bouillons are inoculated and fermented at 35~36° for 24 hours. The original solution contains 0.93% of fructose.

TABLE VI.

Lot of culture solution	Before fermentation	After fermentation		
	pH	pH	Sugar (as glucose) (%)	Turbidity
A	3.6	4.0	0.93	clear
B	4.3	4.0	0.93	〃
C	5.3	4.7	0.50	turbid
D	5.8	5.2	0.48	〃
E	6.3	5.6	0.43	〃
F	6.7	5.9	0.39	〃

As Table VI shows, the mannitol-forming bacteria can not grow in the solution below pH 4.3 and the bacterial activities become more and more luxuriant as pH nears to 7.

SUMMARY

(1) The author isolated mannitol-forming bacteria from sweet potatoes.

Mannitol is produced in a solution containing fructose by the bacterial reduction, but not formed by the fermentation of glucose, galactose and mannose.

(2) The bacteria are short rod forms and their optimum temperature is 36～37°, and their activities decrease largely when the culture solution changes below pH 4.

(3) Mannitol is formed simultaneously with a volatile acid and an unvolatile acid. The unvolatile acid is lactic.

I wish to thanks Dr. Umetaro Suzuki for his valuable advices.

On the Mannitol-forming Bacteria Isolated from Kaki-fruits (*Diospyros Kaki*).

By Yasuo Iwasaki.

(Chiba Horticultural College, Matsudo-machi, Chiba-ken.)

(Received October 10, 1935.)

The author isolated previously mannitol-forming bacteria from sweet potatoes, and now again a different species, from Kaki-fruits.

Isolation and characteristics of the bacteria :-

Kaki-fruits (astringent or non-astringent) are grated and some water is added to it, and the mixture is fermented at 30°. Mannitol-forming bacteria are isolated from the fermented juice by the plate culture method.

The cell is short rod form and a few cells remain attached to each other and form chains. The length of the cell is 0.7～1.0 μ, and average, 0.9 μ. The bacteria are non-motile and Gram's stain is positive.

Agar slants (incubation at 30° for 3 days):

	Kaki-fruits water extract	Yeast water	Potato extract (sucrose added)
Extent of growth	medium	medium	Good
Form of growth	beaded	beaded	echinulate
Optical character	translucent	translucent	opalescent
Oder	acid (?)	acid (?)	acid

Agar plate cultures (incubated at 30～32° for 3 days):

The colonies on bouillon, Kaki-fruits extract and yeast water agar plate cultures are circular and convex, and the surface is smooth. Color is opalescent on bouillon, and very light blue on Kaki-fruits and yeast water. The formation of the colonies on Kaki-fruits agar plate culture is the latest of the three. After 3 days, the diameters of the colonies on Kaki-fruits culture are 1 mm, and on bouillon and yeast water cultures, 1.5 mm.

Isolation and identification of mannitol :–

A sterilized Kaki-fruits water extract is inoculated by the isolated bacteria and fermented. The conditions of the fermentation and the isolation of the produced mannitol are similar to the case of sweet potatoes. The melting point of the isolated mannitol is 164∼165° (uncorr.) and that mixed with mannitol does not change.

Found : C, 39.21, 39.16 ; H, 8.13, 7.76%. $C_6H_{14}O_6$ requires C, 39.56 ; H, 7.69%.

Sugars which are utilized by the bacteria :–

1. The culture solutions are prepared by adding 2% of Merck's glucose, fructose, mannose and galactose respectively to bouillons. The sterilized solutions are inoculated and fermented at 30∼32°. Sugars are determined by Bertland's method and the quantity of the sugars in the solutions are showed as copper 100.

TABLE I.

Lot of solution	Before fermentation		After fermentation				
	pH	sugar	1st day	2nd day	3rd day	pH	sugar
fructose	5.8	100	turbid, white sediment is more than the other lots.	turbid, white sediment is more than the other lots and 1st day.	turbid, white sediment is in 1st order.	5.0	69.0
glucose	6.2	100	turbid, white sediment is almost equal,	turbid, white sediment is more than 1st day.	turbid, white sediment is in 3rd order.	4.9	90.8
galactose	5.6	100	turbid,	turbid,	turbid, white sediment is in 2nd order.	5.4	97.4
mannose	5.3	100	turbid.	turbid,	turbid, white sediment is in 4th order.	4.9	99.5

2. 3 gr of fructose, glucose, mannose and galactose are added respectively to 150 ml of yeast water (Bé. 0.65) and moreover, 3 gr of Ca-carbonate are added to each flask. The sterilized solutions are inoculated and fermented at 30° for 4 days.

TABLE II.

Lot of solution	Before fermentation		After fermentation					
	pH	sugar	1st day	2nd day	3rd day	4th day	pH	sugar
fructose	6.1	100	turbid (1)*	turbid (1)	turbid	turbid	4.8	6.6
glucose	6.1	100	〃 (2)	〃 (2)	〃	〃	5.0	63.1
galactose	6.1	100	〃 (3)	〃 (3)	〃	〃	5.4	95.6
mannose	6.1	100	〃 (4)	〃 (4)	〃	〃	5.2	89.6

* The order of the turbidity. After 3rd day, the turbidity in each lot is almost equal.

According to the above cited results, the isolated bacteria consume most copiously fructose and the consumed amount of glucose is far less than fructose. This experimental result is similar to the consumption of sugars of the bacteria from sweet potatoes.

3. A glucose-yeast water containing 3 gr of Ca-carbonate is inoculated with the bacteria and fermented at 30～32° for 4 days.

TABLE III.

	Glucose (gr)	pH
Before fermentation	2.94	6.1
After fermentation	1.64	5.1

1.30 gr of the glucose is consumed at the fermentation but the isolation of mannitol by the following method is not succeeded.

Changes of acids, mannitol and sugar in the fermented juice :–

200 ml of the sterilized fructose-yeast water are inoculated and kept at 30°, and acids, mannitol, sugar, and pH which change in every 24 hours are determined.

The determination of mannitol was carried as follows :

2 gr of $Ca(OH)_2$ are added to the fermented liquid and heated in a boiling water bath for 2 hours in order to destroy the fructose containing in the liquid and then the liquid is neutralized with oxalic acid. After the neutralized solution is concentrated on a boiling water bath, the syrupy liquid is solidified with some plaster of Paris. The mass is extracted with 150 ml of 93% alcohol on a boiling water bath for 3 hours. . This treatment is repeated four times. These alcohol extracts are united and concentrated. Then, mannitol crystalized out and is weighted.

TABLE IV.

Fermenting days	Titration numbers of 0.1N KOH for 10 ml of fermented juice (ml)	pH	Sugar (as glucose) (%)	Produced mannitol	$\frac{\text{Mannitol}}{\text{Total sugar}}\times 100$	$\frac{\text{Mannitol}}{\text{Consumed sugar}}\times 100$
original solution	1.6	5.2	1.80	——	——	——
1	2.1	5.0	1.64	no	——	——
2	3.3	4.1	1.38	0.36	10.0	42.7
3	3.7	3.9	1.34	0.49	13.6	53.3
4	3.9	3.8	1.22	0.61	16.9	52.6
5	3.9	3.9	1.17	0.36	10.0	26.5
6	4.0	4.0	1.08	0.61	16.5	28.2

Under the direction of Prof. Dr. Takahashi*, yeast water is fermented with or without $CaCO_3$ and the produced mannitol is determind. The culture solutions are incubated at 30°C for 3 days.

A …… 200 ml yeast water is neutralized with KOH.
B …… 200 ml yeast water.
C …… 200 ml yeast water is added with 4 gr of $CaCO_3$.

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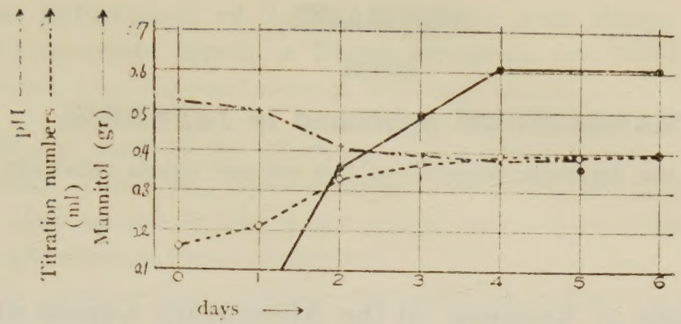
* Takahashi and Asai : J. Agr. Chem. Soc. Japan, **10**, 60～66 (1934).



	Before fermentation		After fermentation		Produced mannitol (gr)	Consumed sugar (gr)	$\frac{\text{Mannitol}}{\text{Total sugr}} \times 100$	$\frac{\text{Mannitol}}{\text{Consumed sugar}} \times 100$
	pH	Sugar (%) (as invert sugar)	pH	Sugar (% as invert sugar				
A	6.5	1.07	4.3	0.47	0.58	1.20	27.1	48.3
B	5.8	1.87	4.2	1.20	0.55	1.34	14.7	41 0
C	6.3	1.87	5.0	0.37	1.23	3.00	32.9	41.0

Isolation of mannitol from the fermented liquid which is the water extract of Kaki-fruits peel :–

Kaki-fruits peel is produced a large amount as a waste by making dried fruits in Japan. The peel is minced with a chopper and some water is added to the minced peel. The mixture is fermented at a warm place. Then, the fermentation is occurred by the mannitol-forming bacteria which adhere to the peel.

From 1 kg of the said peel, 22 gr of mannitol are obtained. And 35 gr of mannitol are obtained from 3 L of grated Kaki-fruits water extract containing 5.9% as invert sugar.

SUMMARY

The author isolated mannitol-forming bacteria from Kaki-fruits, which produce mannitol from fructose, but not from glucose, mannose and galactose. They are short rod forms, but more spherical than those bacteria isolated from sweet potatoes. These bacteria isolated from Kaki-fruits grow on the potato agar slant with porcelaneous optical character but those bacteria from sweet potatoes, with translucency.

ABSTRACTS
from
TRANSACTIONS published in JAPANESE

(Pages refer to the Japanese originals of this volume unless otherwise noticed)

Distribution of Xylanase in the Alimentary Canals of Higher Animals.—The Nutritive Value of Pentosan. VI. (pp. 1017～1023): By Hisayoshi IWATA. (Morioka Agricultural College.)

Digestion by Intestinal Enzyme.—Nutritive Value of Pentosan. V.) (pp. 1024～1027): By Hisayoshi IWATA. (Morioka Agricultural College.)

Xylanase was found in the intestines of rabbits and pigs. The action of it was, however, very weak if compared with that of coexisted amylase. The optimum condition for it was found to be pH 6, 38°C.

Chemical Studies on Japanese Coccidae. X.—On the Nitrogenous and Inorganic Constituents of *Prontapsis yanonensis* Kuw. (pp. 1028～1034): By M. KAWANO and R. MARUYAMA. (Laboratory of Osaka Factory of Sankyo Co. Ltd.)

Oryzanin "Antineuritic Vitamin". IV.—On the Activity of Oryzanin. (pp. 1035～1051): By Sator OHDAKE and Teikichi YAMAGISHI. (Agricultural Chemical Laboratory, Faculty of Agriculture, Tokyo Imperial University.)

Oryzanin "Antineuritic Vitamin". V.—On the Thermostability of Oryzanin. (pp. 1052～1054): By Sator OHDAKE and Teikichi YAMAGISHI. (Agricultural Chemical Laboratory, Faculty of Agriculture, Tokyo Imperial University.)

On the Influences of Lime Nitrogen and Some of Derivatives of Cyanamide upon a Plant Growth. (pp. 1055~1074): By Shutaro TESIMA. (Agr. Chemical Laboratory, Tokyo Imp. University.)

A study was made of the influences of lime nitrogen, urea, dicyandiamid, guanidin-nitrate, -carbonate, -hydrochloride, -phosphate and guanylurea-phosphate on a plant growth by the water culture and pot experiment methods.

The results obtained was as follows:

(1) The water culture solutions containing dicyndiamid, guanidin-nitrate and -carbonate in the quantities of 0.007 to 0.0035 per cent as nitrogen are injurious to the growth of young paddy rice and barley plants, and urea, sodium nitrate and ammonium sulphate in five to ten times of that equivalent do harm at last.

(2) A great extent of the injurious effects of dicyandiamid, guanidin compounds and guanylureaphosphate on the plants (Brassica, Chinensis, radish, barley, upland rice and paddy rice), especially some of field plants are observed when sow or transplant immedictly after the application of them to a soil, while a small extent when decreased quantities of them (0.1 g N to 1.6 kg of air dried soil) are applied two weeks before, and above all for paddy rice the manurious values of them are fairly recognised even though they are yet inferior to these of ammonium sulphate and lime nitrogen. Among those guanidin and guanylureacompounds, guanidinhydrochloride is most harmful as it is toxic to a root growth and guanylureaphosphate is less.

In generally it is favorable to use them in conjunction with compost and lime.

Reserches on the Cellulose Resources. Part IV.—Chemical composition of cotton stalk. (pp. 1075~1076): Kisaburo SHIMBO.

The result of the chemical analysis of cotton stalk, (bark bast and epidermis) and wood part) were reported.

		whole stalk		wood		Bark	
		air dry	abs. dry	air dry	abs. dry	air dry	abs. dry
1.	Moisture	8.91	——	8.48		8.98	
2.	Alcohol-benzene extract	3.66	4.03	3.19	3.49	4.34	4.77
3.	Soluble in 1% NaOH	28.62	31.44	20.15	22.02	45.85	50.39
4.	〃 hot water	13.01	14.28	8.94	9.77	20.35	22.36
5.	〃 cold water	10.51	11.54	7.47	8.16	15.12	16.62

6.	Total cellulose	42.78	46.96	46.50	50.82	34.43	37.84
	α-cellulose	67.51%		68.02%		62.24%	
	β, γ-cellulose	32.49%		31.98%		37.76%	
7.	Lignin	20.63	22.63	21.39	23.38	22.26	24.46
8.	Pentosan	18.38	20.18	19.74	21.58	13.67	15.02
9.	Mannan	—	—	—	—	—	—
10.	Galactan	1.23	1.35	0.50	0.54	2.39	2.63
11.	Hemi-celluloses (8+9+10)	19.61	21.53	20.24	22.12	16.06	17.65
12.	Methoxyl	3.93	4.31	4.98	5.44	2.49	2.74
13.	Nitrogen	0.77	0.84	0.46	0.50	1.05	1.15
14.	Crude protein	4.81	5.29	2.87	3.14	6.59	7.24
15.	Ash	2.71	2.98	2.20	2.40	5.26	5.78
16.	Ca-pectate number	1.82	2.00	0.40	0.44	7.47	8.21
17.	CH_3O/Lignin×100	(19.0)		(23.3)		(11.2)	
18.	CH_3O in Lignin			18.78		7.37	

Studies on Canavanin (VI). (pp. 1077~1082): By Matsunosuke KITAGAWA and Akishige TAKANI. (Biochemical Laboratory, Kyushu Imperial University.)

In a previous paper (1932), we assumed canalin, the fermentative product of canavanin, to be a α-derivative of hydroxylamine and proposed $NH_2 \cdot O \cdot CH_2 \cdot CH_2 \cdot CH(NH_2) \cdot COOH$ as its constitutional formula.

Now we prepared α-hydroxylamino acetic acid, $NH_2 \cdot O \cdot CH_2 \cdot COOH$, from benzhydroximic acid and α-Br-acetic acid, and proved it to show the same properties as indicated by canalin, namely, the indication of Jaffe reaction, the production of ammonia and corresponding oxy acid on the catalytic reduction, and the formation of a kind of guanido derivative, having $NH_2C(NH)NHO$-radical, on guanidation.

These resemblances between canalin and α-hydroxylamino acetic acid are considered to indicate the presence of α-hydroxylamino group NH_2O- in the canalin molecule.

Next, we guanidated α-benzoylcanalin with methyl isourea, and after treating the reaction product with 10% HCl solution at 100°, we isolated the guanido derivative as flavianate.

The flavianate thus prepared, was identical with the flavianate of canavanin in its characteristic melting point and some chemical properties.

We, therefore, put forward herein $NH_2 \cdot C(NH) \cdot NHO \cdot CH_2 \cdot CH_2 \cdot CH(NH_2) \cdot COOH$, as the constitutional formula of canavanin.

Studies on the Nutritive Value of Canavanin. (pp. 1083~1088):

By Matsunosuke KITAGAWA and Masahuto WADA. (Biochemical Laboratory, Kyushu Imperial University, Fukuoka, Japan.)

In order to study the meaning of the growth-promoting potency of canavanin reported by Ogawa, we fed young albino rats weighing about 40 g on the basal diet, free from vitamin B_2, consisting of 76% purified rice starch, 10% purified fish protein, 10% soja bean oil hydrogenated and 4% Mc Collum' salt mixture, supplemented with Biosterin or cod liver oil and pure vitamin B_1, in which case the rats gained scarcely in their body weights, and with the addition of canavanin to such a basal diet, they were not restored to the normal growth.

The effect of canavanin for the normal growth was not observed, too, when fed on the above basal diet, supplemented with the autoclaved yeast or the alcoholic extract of soja bean, instead of pure vitamin B_1.

We, therefore, could not determine the meaning of the growth-promoting potency of canavanin.

Biochemical Studies on "Sotetsu", the Japanese Sago Plant. IV.—On the Emuicin of Sotetsu. (pp. 1089~1094):

By Kotaro NISHIDA. (Agricultural Colledge of Kagoshima.)

On the Soil Formation in the North-Kyushu. (pp. 1095~1100):

By R. KAWASHIMA and T. HASEGAWA.

1. The chemical properties of the soils formed from andesite and porphyrite in the North-Kyushu were examined.

2. The climatic conditions of related districts are as follows:

locality	years observed	mean annual temp. (°C)	mean annual precipitation (mm)	relative humidity	Meyer's NS quotient
Fukuoka	41	15.5	1789.2	78.1	625
Kumamoto	42	14.9	1586.7	77.9	571

3. Fine Soil below 2 mm in diameter was treated with hot conc. HCl and analysed as usual. From the analytical data some molecular ratios are calculated.

soil	rock	$\frac{SiO_2}{Al_2O_3}$	$\frac{SiO_2}{R_2O_3}$	$CaO+MgO+K_2O+Na_2O/Al_2O_3$	$CaO+K_2O+Na_2O/Al_2O_3$
Kumamoto, 1	andesite	1.94	1.50	0.06	0.02
″ , 2	″	1.68	1.35	0.24	0.16
Fukuoka, 1	″	2.85	2.18	0.31	0.26
″ , 2	″	2.32	1.73	0.10	0.02
″ , 3	porphyrite	2.08	1.33	0.27	0.02
″ , 4	″	2.34	1.41	0.24	0.05

4. Clay fractions below 0.001 mm in diameter were separated by settling method and analysed by using Hardy's Tri-acid mixture and hot conc. HCl. From the analytical results SiO_2/Al_2O_3 and SiO_2/R_2O_3 are given:

soil	rock	by Tri-acid		by HCl	
		$\frac{SiO_2}{Al_2O_3}$	$\frac{SiO_2}{R_2O_3}$	$\frac{SiO_2}{Al_2O_3}$	$\frac{SiO_2}{R_2O_3}$
Kumamoto, 1	andesite	1.80	1.47	2.23	1.71
″ , 2	″	1.25	1.10	1.31	1.15
Fukuoka, 1	″	2.49	1.96	3.05	2.16
″ , 2	″	1.86	1.53	1.62	1.32
″ , 3	porphyrite	1.92	1.49	1.85	1.47
″ , 4	″	2.45	1.76	2.34	1.62

5. Considering the above tables, the author may conclude that the natur of soil formation in Kumamoto is nearly allitic and in Fukuoka is allit-siallitic.

Relations between Coagulation of Protein and Redoxpotential.

(pp. 1101∼1104): By Yukihiko NAKAMURA. (Agr. Chemical Laboratory, Hokkaido Imperial University, Japan)

The author had studied the changes of the redoxpotentials of the solutions of egg- and serum-albumins by the treatment with heat and with ultraviolet ray and also the changes of the redoxpotentials of the milk solution by the treatment with enzyme.

By the described treatments, the solution systems had lowered their redoxpotentials.

Therefore, the author is able to deduce that the chemical change progressing while the coagulation of protein is in close connenction with the hydrolysis.